

AMENDMENTS

Please amend this application as follows.

5 In the Claims

Please rewrite claims 1, 15 and 20, and add new claims 32 and 33, as set out below.

- 10 1. (Currently amended) A gas-permeable membrane which is useful in the packaging of respiring biological materials and which comprises
- (a) a microporous polymeric film comprising a network of interconnected pores such that gases can pass through the film, and
- (b) a polymeric coating on the microporous film,
- 15 wherein
- (1) the pores in the microporous film have an average pore size of less than 0.24 micron; and
- (2) the microporous film was prepared by a process comprising the steps of
- (A) preparing a uniform mixture comprising a polymeric matrix material in the form of a powder, a finely divided, particulate, substantially water-insoluble filler, and a processing oil;
- (B) extruding the mixture as a continuous sheet;
- (C) forwarding the continuous sheet, without drawing, to a pair of heated calender rolls;
- 25 (D) passing the continuous sheet through the calender rolls to form a sheet of lesser thickness;
- (E) passing the sheet from step (D) to a first extraction zone in which the processing oil is substantially removed by extraction with an organic extraction liquid which is a good solvent for the processing oil, a poor solvent for the polymeric matrix material, and more volatile than the
- 30 processing oil;

(F) passing the sheet from step (E) to a second extraction zone in which the organic extraction liquid is substantially removed by steam or water or both; and

(G) passing the sheet from step (F) through a forced air dryer to remove residual water and organic extraction liquid; and

(3) the polymeric coating has a thickness such that the membrane

(i) has a P_{10} ratio, over at least one 10°C range between -5 and 15°C , of at least 1.3;

(ii) has an oxygen permeability (OTR) at all temperatures between 20 and 25°C , of at least $775,000 \text{ ml/m}^2.\text{atm.24 hrs}$ ($50,000 \text{ cc/100 inch}^2.\text{atm.24 hrs}$; and

(iii) has a CO_2/O_2 permeability ratio (R) of at least 1.5;

the P_{10} , OTR and R values being measured at a pressure of 0.035 kg/cm^2 (0.5 psi).

~~subject to the proviso that the polymeric coating does not comprise a crystalline polymer having a peak melting temperature T_p of -5 to 40°C , an onset of melting temperature T_o such that $(T_p - T_o)$ is less than 10°C , and a heat of fusion of at least 5 J/g .~~

2. (Previously amended) A membrane according to claim 1 wherein the polymeric matrix material is selected from the group consisting of

(i) an essentially linear ultrahigh molecular weight polyethylene having an intrinsic viscosity of at least 18 deciliters/g and

(ii) an essentially linear ultrahigh molecular weight polypropylene having an intrinsic viscosity of at least 6 deciliters/g.

3. (Previously amended) A membrane according to claim 1 wherein at least 70% of the pores in the microporous film have a pore size of less than 0.24 micron.

4. (Previously amended) A membrane according to claim 1 wherein at least 90% of the pores in the microporous film have a pore size of less than 0.24 micron.

5. (Previously amended) A membrane according to claim 1 wherein substantially 100% of the pores in the microporous film have a pore size of less than 0.24 micron.

6. (Previously amended) A membrane according to claim 1 wherein at least 80% of the pores in the microporous film have a pore size less than 0.15 micron.

7. (Previously amended) A membrane according to Claim 1 which has an OTR of at least 1,550,000 ml/m².atm.24 hrs (100,000 cc/inch².atm.24 hrs), and an R ratio of at least 2, the OTR and R values being measured at a pressure of 0.7 kg/cm² (10 psi).

8. (Previously amended) A membrane according to claim 7 which has an OTR of at least 2,325,000 ml/m².atm.24 hrs (150,000 cc/100 inch².atm.24 hrs) measured at a pressure of 0.7 kg/cm² (10 psi).

9-10. Canceled

11. (Previously amended) A membrane according to claim 1 wherein the coating polymer is polydimethyl siloxane.

12. (Withdrawn) A membrane according to claim 1 wherein the coating polymer is cis-polybutadiene, poly(4-methylpentene) or ethylene-propylene rubber.

13. (Previously amended) A membrane according to claim 1 wherein the coating polymer has been crosslinked.

14. (Withdrawn) A membrane according to claim 1 wherein the coating polymer has at least one of the following characteristics:

- (1) it is an acrylate polymer containing at least 40% by weight of units derived from a cycloalkyl acrylate or methacrylate;
- (2) it is a fluoropolymer;
- (2) it is an acrylate polymer containing units derived from a fluoroalkyl acrylate

or methacrylate;

(3) it is an acrylate polymer containing 10 to 70% of units derived from a polyethylene glycol acrylate or methacrylate.

5 11 15. (Currently amended) A membrane according to claim 1 wherein the microporous polymeric film contains pores which are partially blocked by a polymer having an R ratio of less than 1.3 or by a particulate material, ~~or (b) has an OTR before coating of less than 15,500,000 (1,000,000).~~

10 12 16. (Previously amended) A package which is stored in air and which comprises

(a) a sealed container, and

(b) within the sealed container, a respiring biological material and a packaging atmosphere around the biological material;

the sealed container including one or more permeable control sections which provide at least the principal pathway for oxygen and carbon dioxide to enter or leave the packaging atmosphere, at least one said permeable control section being a gas-permeable membrane as defined in claim 1.

17-19. Canceled

20 20. (Currently amended) A gas-permeable membrane which is useful in the packaging of respiring biological materials and which comprises

(a) a microporous polymeric film comprising a network of interconnected pores such that gases can pass through the film, and

25 (b) a polymeric coating on the microporous film,

wherein

(1) the pores in the microporous film have an average pore size of less than 0.24 micron;

(2) at least 70% of the pores in the microporous film have a pore size of less than 0.24 micron;

(3) less than 20% of the pores in the microporous film have a pore size less than 0.014 micron;

(4) at least 80% of the pores in the microporous film have a pore size less than 0.15 micron; and

(5) the polymeric coating has a thickness such that the membrane

(i) has a P_{10} ratio, over at least one 10°C range between -5 and 15 °C, of at least 1.3;

(ii) has an oxygen permeability (OTR), at all temperatures between 20° and 25°C, of at least 775,000 ml/m².atm.24 hrs (50,000 cc/100 inch².atm.24 hrs; and

(iii) has a CO₂/O₂ permeability ratio(R) of at least 1.5;

the P_{10} , OTR and R values being measured at a pressure of 0.035 kg/cm² (0.5 psi). $\dot{\bar{z}}$

~~subject to the proviso that the polymeric coating does not comprise a crystalline polymer having a peak melting temperature T_p of -5 to 40 °C, an onset of melting temperature T_o such that $(T_p - T_o)$ is less than 10 °C, and a heat of fusion of at least 5 J/g.~~

21. (Previously added) A membrane according to claim 20 wherein at least 90% of the pores in the microporous film have a pore size less than 0.24 micron.

22. (Previously added) A membrane according to claim 20 wherein substantially 100% of the pores in the microporous film have a pore size less than 0.24 micron.

23. (Previously added) A membrane according to claim 20 wherein at least 80% of the pores in the microporous film have a pore size less than 0.15 micron and at least 70% of the pores in the microporous film have a pore size less than 0.11 micron.

24. (Previously added) A membrane according to claim 20 which has an OTR at all temperatures between 20°C and 25°C of at least 1,550,000 ml/m².atm.24 hrs (100,000 cc/inch².atm.24 hrs) and an R ratio of at least 2.5, the OTR and R values being measured at a pressure of 0.035 kg/cm² (0.5 psi).

25. (Previously added) A membrane according to claim 20 which has an OTR of at least 2,325,000 ml/m².atm.24 hrs (150,000 cc/100 inch².atm.24 hrs) measured at a pressure of 0.07 kg/cm² (10 psi).

26. (Previously added) A membrane according to claim 20 wherein the coating polymer is polydimethyl siloxane.

27. (Withdrawn) A membrane according to claim 20 wherein the coating polymer is cis-polybutadiene, poly(4-methylpentene) or ethylene-propylene rubber.

28. (Previously added) A membrane according to claim 20 wherein the coating polymer has been crosslinked.

29. (Currently amended) A package which is stored in air and which comprises

(a) a sealed container, and

(b) within the sealed container, a respiring biological material and a packaging atmosphere around the biological material;

the sealed container including one or more permeable control sections which provide at least the principal pathway for oxygen and carbon dioxide to enter or leave the packaging atmosphere, at least one said permeable control section being a gas-permeable membrane as defined in claim 20 which comprises

(a) a microporous polymeric film comprising a network of interconnected pores such that gases can pass through the film, and

(b) a polymeric coating on the microporous film,

wherein

(1) the pores in the microporous film have an average pore size of less than 0.24 micron;

(2) at least 70% of the pores in the microporous film have a pore size of less than 0.24 micron;

(3) less than 20% of the pores in the microporous film have a pore size less than 0.014 micron;

(5) at least 80% of the pores in the microporous film have a pore size less than 0.15 micron; and

(5) the polymeric coating has a thickness such that the membrane

(i) has a P_{10} ratio, over at least one 10°C range between -5 and 15 °C, of at least 1.3;

(ii) has an oxygen permeability (OTR), at all temperatures between 20° and 25°C, of at least 775,000 ml/m².atm.24 hrs (50,000 cc/100 inch².atm.24 hrs; and

(iii) has a CO₂/O₂ permeability ratio(R) of at least 1.5;

the P_{10} , OTR and R values being measured at a pressure of 0.035 kg/cm² (0.5 psi).

30. (Previously added) A membrane according to claim 1 wherein the filler is a siliceous filler.

31. (Previously added) A membrane according to claim 20 wherein the microporous polymeric film comprises a polymeric matrix having a siliceous filler dispersed therein.

32. (New) A membrane according to claim 31 wherein the polymeric matrix is composed of polyethylene and the distribution of pore sizes in the microporous film is as set out in the following table :

| Pore Size (microns) | .013 | .016 | .026 | .044 | .058 | .08 | .11 | .15 | .24 | .36 | .6 |
|----------------------------------|------|------|------|------|------|-----|-----|-----|-----|-----|----|
| % of pores larger than pore size | 90% | 80% | 70% | 60% | 50% | 40% | 30% | 20% | 10% | 5% | 2% |

33. (New) A membrane according to claim 30 wherein the polymeric matrix is composed of polyethylene and the distribution of pore sizes in the microporous film is as set out in the following table :

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|----------------------------------|------|------|------|------|------|-----|-----|-----|-----|-----|----|
| Pore Size (microns) | .013 | .016 | .026 | .044 | .058 | .08 | .11 | .15 | .24 | .36 | .6 |
| % of pores larger than pore size | 90% | 80% | 70% | 60% | 50% | 40% | 30% | 20% | 10% | 5% | 2% |